

CLAIMS:

1. Linking unit (100) for generating linking information L indicating components of two consecutive extended segments sp and sc which partially overlap and which may be linked together in order to form a sinusoidal track, the segments sp and sc approximating consecutive segments of a sinusoidal audio or speech signal s, the linking unit comprising:

- 5 - a calculating unit (120) for generating a similarity matrix $S(m,n)$ in response to received sinusoidal code data including information about the amplitudes and the frequencies of M components x_m with $m=1...M$ of the extended previous segment sp and of N components y_n with $n=1...N$ of the extended current segment sc, wherein the values of said similarity matrix represent the similarity between the m'th component x_m of said extended previous segment sp and the n'th component y_n of said extended current segment sc for
10 $m=1...M$ and $n=1...N$; and
 - an evaluating unit (140) for receiving and evaluating said similarity matrix $S(m,n)$ in order to generate said linking information L by selecting those pairs of components (m,n) the similarity of which is maximal at least within the an overlapping region;
15 characterised in that
 - the sinusoidal code data (Dp, Dc) is enlarged by further comprising information about the phase of at least some of the M components x_m and at least some of the N components y_n ;
 - the calculating unit (120) is adapted to calculate the similarity matrix $S(m,n)$
20 by additionally evaluating the phase consistency between the m'th component x_m of the extended previous segment sp and the n'th component y_n of the extended current segment sc.

2. The linking unit according to claim 1, characterised in that the calculating unit comprises:

- 25 - a first pattern generating unit (122) for generating said M components $x_m(t)$ with $m=1...M$ of the extended previous segment sp in response to the previous segment's enlarged sinusoidal code data (Dp);

- a second pattern generating unit (124) for generating said N components $y_n(t)$ with $n=1...N$ of the extended current segment sc in response to the current segment's enlarged sinusoidal code data (Dc); and

- a calculation module (126) for calculating the similarity matrix $S(m,n)$ on the basis of said received M components $x_m(t)$ and of said received N components $y_n(t)$ according to a predefined similarity measure.

3. The linking unit according to claim 2, characterised in that the calculating module (126) is adapted to calculate the overall similarity matrix $S(m,n)$ according to:

$$S(m,n) = S_1(m,n) S_2(m,n)$$

wherein the first similarity matrix $S_1(m,n)$ represents the similarity in shape and the second similarity matrix $S_2(m,n)$ represents the similarity in amplitude or energy between the components m and n .

4. The linking unit according to claim 3, characterised in that the similarity $S_1(m,n)$ is defined according to:

$$S_1(m,n) = \begin{cases} 1 - |\rho_{m,n} - 1| / D_1, & \text{if } |\rho_{m,n} - 1| < D_1, \\ 0, & \text{elsewhere} \end{cases}$$

with $0 < D_1 < 1$

and with

$$\rho_{m,n} = \frac{\sum_t w(t) x_m(t) y_n^*(t)}{\sqrt{E_{xm} E_{yn}}}$$

wherein:

$\rho_{m,n}$: is the similarity measure being a cross-correlation coefficient representing the similarity in shape between components $x_m(t)$ and $y_n(t)$;

$w(t)$: is a window function;

$y_m^*(t)$: is the complex-conjugate component $y_m(t)$;

E_{xm} : is the energy in the signal x_m with: $E_{xm} = \sum_t w(t) x_m(t) x_m^*(t)$;

E_{yn} : is the energy in the signal y_n with: $E_{yn} = \sum_t w(t) y_n(t) y_n^*(t)$.

5. The linking unit according to claim 4, characterised in that the second similarity $S_2(m,n)$ is defined according to:

$$S_2(m,n) = \begin{cases} 1 - (1 - R_{m,n}) / D_2, & \text{if } (1 - R_{m,n}) < D_2, \\ 0, & \text{elsewhere} \end{cases}$$

with $0 < D_2 < 1$

and wherein

$$R_{m,n} = \min \left\{ \frac{E_{cm}}{E_{yn}}, \frac{E_{yn}}{E_{xm}} \right\}$$

6. The linking unit according to claim 3, characterised in that the calculating module (126) is adapted to calculate the first similarity matrix $S_1(m,n)$ according to:

$$S_1(m,n) = \begin{cases} 1 - \left| \frac{x_m(t_0)}{y_m(t_0)} - 1 \right| / D_3, & \text{if } \left| \frac{x_m(t_0)}{y_n(t_0)} - 1 \right| < D_3 \\ 0, & \text{elsewhere} \end{cases}$$

with $0 < D_3 < 1$.

7. The linking unit according to claim 6, characterised in that the calculating module (126) is adapted to calculate the second similarity matrix $S_2(m,n)$ according to:

$$S_2(m,n) = \begin{cases} 1 - \left| \frac{x_m(t_0+1)}{x_m(t_0)} \frac{y_n(t_0)}{y_n(t_0+1)} - 1 \right| / D_4, & \text{if } \left| \frac{x_m(t_0+1)}{x_m(t_0)} \frac{y_n(t_0)}{y_n(t_0+1)} - 1 \right| < D_4 \\ 0, & \text{elsewhere} \end{cases}$$

with $0 < D_4 < 1$.

8. Parametric encoder (400) for encoding an audio- and/or speech signal s into a datastream including sinusoidal code data and linking information L , the encoder comprising:

- a segmentation unit (410) for segmenting said signal s into at least a previous segment sp' and a consecutive partially overlapping current segment sc' ;

5 - a sinusoidal estimating unit (420) for generating said sinusoidal code data in the form of frequency and amplitude data of M components x_m with $m=1...M$ of an extended previous segment sp approximating said segment sp' and of N components y_n with $n=1...N$ of an extended current segment sc approximating said segment sc' ;

- a calculating unit (120) for generating a similarity matrix $S(m,n)$ in response to
10 said received sinusoidal code data wherein the values of said similarity matrix represent the similarity between the m 'th component x_m of said extended previous segment sp and the n 'th component y_n of said consecutive extended current segment sc for $m=1...M$ and $n=1...N$;

- an evaluating unit (140) for receiving and evaluating said similarity matrix $S(m,n)$ in order to generate said linking information L indicating those pairs of components
15 m,n the similarity of which is maximal;

- an arranging unit (430) for generating the datastream representing the original audio- or speech signal by appropriately arranging said amplitude, frequency and linking information;
characterised in that

20 - the sinusoidal code data estimating unit (420) is adapted to further generate information about the phase of at least some of the M components x_m and of at least some of the N components y_n ; and

- the calculation unit (120) is adapted to calculate the similarity matrix $S(m,n)$ by additionally considering the phase consistency between the m 'th component x_m of the
25 extended previous segment sp and the n 'th component y_n of the extended current segment sc .

9. Method for generating linking information L indicating components of consecutive partially overlapping extended segments sp and sc which may be linked together in order to form a sinusoidal track, the segments sp and sc approximating consecutive
30 segments of a sinusoidal audio-/or speech signal s , the method comprising the steps of:

- providing sinusoidal code data including information about the amplitudes and the frequencies of M components x_m with $m=1...M$ of the extended previous segment sp and of N components y_n with $n=1...N$ of the extended current segment sc ;

- calculating the similarity matrix $S(m,n)$ according to a predetermined similarity measure wherein the similarity matrix represents the similarity between the m 'th component x_m of said extended previous segment sp and the n 'th component y_n of said extended current segment sc for $m=1...M$ and $n=1...N$; and
- 5 - evaluating said similarity matrix $S(m,n)$ in order to generate said linking information L by selecting those pairs of components m and n the similarity of which is maximal;
characterised in that
- the step of providing the sinusoidal code data further includes the provision of
- 10 information about the phase of at least some of the M components x_m and of at least some of the N components y_n ; and
- the similarity matrix $S(m,n)$ is calculated by additionally considering the phase consistency between the n 'th component y_n of the extended previous segment sp and the m 'th component x_m of the extended current segment sc .